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The self-medication time frame affects its reported frequency: systematic literature review and meta-analysis from the Colombian population

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The self-medication time frame affects its reported frequency: Systematic literature review and meta-analysis from the Colombian population

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ABSTRACT

Purpose: Self-medication is a practice commonly studied through surveys, so the time frame and recall period can affect the reported frequency. This study was aimed to estimate the prevalence of self-medication and its associated factors in Colombian youth and adults and to explore the potential effect of the self-medication time frame on its reported frequency.

Methods: Comprehensive systematic literature review and meta-analysis of the studies on self-medication in Colombia published from January 2000 - June 2022.

Results: A total of 12 studies (n=5,668) were included, and a pooled prevalence of self-medication of 64.2% (95% CI 50.8%-77.5%) was found. When a subgroup analysis was performed according to the self-medication time frame, the prevalence was significantly lower when self-medication was evaluated during the last 30 days (32.3%; 95% confidence interval [CI] 25.4%-39.3%), compared to longer recall periods. The self-medication frequency was greater in female university students (OR= 1.72; 95% CI 1.17-2.53) than in males. The most frequently used medications were analgesics (29.5%), anti-inflammatories (22.4%), antihistamines (9.9%), and antibiotics/antiparasitics (16.7%). As determinants of self-medication, lack of time and delays in medical care were reported in 35.2% (95% CI 25.6%-44.7%) of the cases.

Conclusions: Self-medication in Colombia is a public health concern. The self-medication time frame significantly affected the reported frequency, with a lower pooled prevalence of self-medication in the last 30 days, compared to longer time frames. Developing and validating an instrument to assess self-medication using a short time frame would permit more reliable population measurements.

KEYWORDS: Self-medication, prevalence, Colombia, systematic review, meta-analysis.

KEY POINTS

- A total of 12 studies (n=5,668) were included, and a pooled prevalence of self-medication of 64.2% (95% CI 50.8%-77.5%) in Colombian youth and adults was found.
- The prevalence was significantly lower when self-medication was evaluated during the last 30 days (32.3%; 95% CI 25.4%-39.3%) compared to more extended time frames (six months, one year, or throughout life).
- The most frequently used medications were analgesics (29.5%), anti-inflammatories (22.4%), antihistamines (9.9%), and antibiotics/antiparasitics (16.7%).
- Developing and validating an instrument to assess self-medication, especially responsible self-medication, using a short time frame would permit more reliable population measurements.

PLAIN LANGUAGE SUMMARY

Self-medication is the practice of using medications for self-diagnosed symptoms without the prescription of a health professional. This practice is commonly studied through surveys, so the time frame and recall period can affect the reported frequency. A comprehensive systematic literature review and meta-analysis with 12 studies (n=5,668) on self-medication in Colombia published from January 2000 - June 2022, determined that the pooled prevalence of self-medication in Colombian youth and adults was 64.2%. However, the prevalence was significantly lower when self-medication was evaluated during the last 30 days (32.3%) compared to more extended time frames (six months, one year, or throughout life). The self-medication frequency was greater in female university students than in males. The most frequently used medications were analgesics (29.5%), anti-inflammatories (22.4%), antihistamines (9.9%), and antibiotics/antiparasitics (16.7%). As determinants of self-medication, lack of time and delays in medical care were reported in 35.2% (95% CI 25.6%-44.7%) of the cases. Previous studies and meta-analyses had not considered the possible effect of the recall period on the frequency of self-reporting. Developing and validating an instrument to assess self-medication, especially responsible self-medication, using a short time frame would permit more reliable population measurements.

INTRODUCTION

Self-medication involves using medicinal products to treat self-recognized disorders or symptoms or the intermittent or continued use of a medication prescribed by a physician for chronic or recurring diseases or symptoms (1). Self-medication, interpreted as a form of self-care to promote or maintain health, is widespread, with an estimated global frequency of 67% (2). Responsible self-medication is carried out with over-the-counter (OTC) drugs available in pharmacies, using medications for the intended indications, and reading and following the manufacturer's instructions on the label and package insert (3).

Unresponsible self-medication can result in health risks, such as delayed diagnosis and treatment of disease, adverse drug reactions, drug-drug interactions, and antimicrobial resistance (4,5). The World Health Organization has reported that purchasing prescription-only drugs without a prescription is more common than purchasing OTC drugs (1). In developing countries, self-medication is less common among high-income people with health insurance and more common among low-income people with no affiliation to the health system (6).

Although most of the world population self-medicates or has done so at some point, the frequency of self-medication and its associated factors varies depending on the population studied, with prevalence ranging from 56 to 74% between continents (2). However, the available meta-analyses have yet to consider the possible effect of the recall period on the frequency of self-reporting. Although studies on self-medication have been carried out in Colombia, there are no systematic reviews, nor is there a global quantitative estimate (meta-analysis) of its prevalence. Therefore, the objectives of this systematic review and meta-

analysis were to estimate the prevalence of self-medication and its associated factors in young people and adults in Colombia and to explore the potential effect of the self-medication time frame on its reported frequency.

MATERIALS AND METHODS

To estimate the prevalence of self-medication and its associated factors in young people over 16 years of age and adults in Colombia, two steps were taken: (i) a comprehensive systematic literature search, and (ii) meta-analyses based on the existing studies. According to the Health Sciences Descriptors (Spanish acronym DeCS), self-medication was defined as the self-treatment of the signs and symptoms of any condition or disease through the self-administration of medications, either OTC or those that a doctor has not prescribed.

Comprehensive systematic literature search

Search strategy. A comprehensive systematic literature review was conducted and reported according to the standards set out in *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (7) and guided by the overview of Munn and colleagues (8). The search was performed to identify studies published from January 2000 – June 2022, in English, Spanish, and Portuguese. The search was conducted in multiple electronic bibliographic databases: MEDLINE, PubMed, Academic Search, Web of Science (including Science Citation Index, Social Sciences Citation Index, and Arts and Humanities Citation Index), LILACS, the catalog of the Universidad Nacional de Colombia (UNAL), BIBLAT, and Google Scholar. Multiple combinations of the following keywords were used: cross-sectional study, statistics and numerical data, prevalence, multivariate analysis, bivariate analysis, and Colombia. In addition, the citations in the relevant articles were manually screened.

Study selection. The following inclusion criteria were then applied to determine eligibility: (i) primary and secondary sources studies; (ii) descriptive studies (cross-sectional, cohort, case-control, and prospective), carried out in Colombia and reporting the prevalence of self-medication in young people and adults, as well as its associated factors; and (iii) articles, theses, and book chapters. Studies were excluded if: (i) they were review articles, letters to the editor, editorials, comments, expert opinions, case studies, case series, or conference abstracts, and (ii) they were published in languages other than English, Spanish, or Portuguese. The selection of the studies was carried out by two investigators independently, and discrepancies were resolved by consensus.

Quality assessment of studies. Using a standardized form, each study's bias risk was assessed using Hoy et al.'s criteria (9). Each criterion was assessed as 0 if the risk of bias was low; 0.5 if the risk was intermediate or unclear; and 1 if the risk was high. The sum of the scores for the 10 criteria indicated the overall risk of bias of the study, was defined as criterion 11, and was used to determine whether a study was included in the analysis. Studies with scores of 0-3 were considered low risk and were included in the quantitative analysis; studies with scores of 4-6 had moderate risk and were excluded, as well as those with scores of 7-10, which had a high risk of bias. This process of assessing the quality and risk of bias of the studies was carried out independently by two investigators, and when discrepancies were found, the final scoring and the decision to include or exclude the study was made by consensus. The summary figure of the studies' risk of bias was prepared using the RevMan v5.0 package (Supplementary Figure 1).

Data extraction. Using a standardized format in Microsoft Excel, two authors independently extracted data on study characteristics (first author, publication date, characteristics) and outcomes of interest (sample size, self-medication time frame, prevalence of self-medication, women who self-medicated, men who self-medicated, lack of time and delays in medical care as causes of self-medication, and use of analgesics, anti-inflammatories, antihistamines, antibiotics and antiparasitics). When the prevalence of self-medication was evaluated in several time frames in the same study, the data were extracted separately.

Data processing and meta-analysis. Relevant data extracted from the included studies in the Microsoft Excel format were exported to the statistical package Stata v17. A random-effects meta-analysis model was used to estimate DerSimonian and Laird's pooled effect to show heterogeneity. Subgroup analysis was conducted to adjust random variation between point estimates of the original studies and investigate how the prevalence of self-medication fluctuates across subgroups depending on the self-medication time frame. The outliers within the included articles were checked using sensitivity analysis. Publication bias across studies was assessed using a funnel plot, Egger's regression test, and Begg's test (Z statistic) at 0.05. A forest plot format presented the point prevalence (percent) and 95% confidence intervals (CIs). In this plot, each crossed line referred to a 95% CI. The odds ratio (OR) was used to determine the association between self-medication and sex, and point prevalence (percent) was used for causes of self-medication and medications groups.

RESULTS

Search results

Initially, the search yielded 31 studies. After removing one duplicate, 30 studies were screened using title and abstracts, 24 of which (16 articles and eight theses) underwent methodological evaluation. Eleven studies with moderate and high risk of bias were excluded, and the reasons for their exclusion are presented in Supplementary Table I. Ultimately, 13 were included for the qualitative and quantitative synthesis: 12 about general self-medication with 5,668 participants were used for the pooled prevalence estimation, and one about self-medication with antibiotics and 140 participants was used only when analyzing medication groups (Figure 1).

Study characteristics

Table I shows that a total of 12 studies with 5,668 participants were included for the systematic review and meta-analysis of self-medication prevalence. One additional study with 140 participants was included for the analysis of antibiotic and antiparasitic use through self-medication (10). All the included studies had a cross-sectional design and were published between 2002 and 2021. The sample sizes ranged from 140 in Cali (10) to 1,127 in Pereira (11). The prevalence of self-medication varied from 32.3% in Pereira (11) to 84.7% in Neiva (12). Regarding geographical distribution, five studies were conducted in the Caribbean region (13–17), three in the Andean region (11,12,18), four in the capital city Bogotá (19–22), and one in the Pacific region (10). There were no studies from the Amazonia and Orinocco regions. Nine studies included adults from the general population (10,11,13–16,18–20), and four included university students (12,17,21,22). Six studies used instruments with no known validity or reliability (12,17–20,22) and seven used instruments with partially

documented validity and reliability (10,11,13–16,21). The overall risk of bias score of the included studies was between 0.5/10 and 2.5/10. The supplementary material contains the risk of bias graph.

Each study used a different self-medication time frame (Table I), so they were categorized into three subgroups. Five studies with 2,344 participants were included in the subgroup that evaluated current self-medication and in the last 30 days. Five studies with 2,355 participants were included in the subgroup that evaluated self-medication during the last year and throughout life. Four studies with 1,383 participants were included in the subgroup that evaluated self-medication in university students during the last six months and throughout life. Two studies evaluating self-medication in various time frames (13,18) were simultaneously included in both subgroups 1 and 2, and their data were extracted separately for meta-analysis. One study evaluated self-medication with antibiotics and was included only in the analysis by medication groups (10).

Meta-analysis

Self-medication prevalence. The pooled prevalence of self-medication among the Colombian youth and adult population was 62.4%, with a 95% CI from 47.2 to 77.7%. As the I^2 statistic revealed, there was a high degree of heterogeneity across studies (I^2= 99.6%, p<0.001). The random effects model was assumed for this meta-analysis.

Subgroup and sensitivity analysis. No significant change in the degree of heterogeneity was observed when trying to exclude outliers, or one or more studies. For this reason, all the studies were included in the meta-analysis and a subgroup analysis was performed according

to the self-medication time frame and the type of population (general population or university students). The subgroup analysis revealed a lower frequency of self-medication among the general population when evaluated during the last 30 days, (32.3%; 95% CI 25.4%-39.3%). In contrast, the prevalence of self-medication was significantly higher when evaluated in the general population during the last year or lifetime (74.6%; 95% CI 61.3%-87.9%) and in university students during the last six months or lifetime (84.7%; 95% CI 75.1%-94.3%), with no significant difference between them (Figure 2A). Therefore, the effect of the time frame during which the self-medication behavior is evaluated seems more important than the effect of age or the university student status. We did not find evidence of publication bias (Egger's regression test, one-tailed, p= 0.2924; Begg's correlation test, one tailed, p= 0.3811).

Prevalence of self-medication according to sex. Data on the frequency of self-medication in women and men were extracted from 10 studies. In the meta-analysis, no significant association was observed between sex and self-medication, with a pooled OR of 1.12 (95% CI 0.87–1.44). Moreover, the subgroup analysis showed no association between self-medication and sex among the general population in the last 30 days (OR= 0.87; 95% CI 0.57-1.32); nor in the last year or at some point in life (OR= 1.11; 95% CI 0.61-2.03). In contrast, female university students had a greater probability of self-medication in the last six months or throughout their lives than males (OR= 1.72; 95% CI 1.17-2.53) (Figure 2B). We did not find evidence of publication bias (Egger's regression test, one-tailed, p= 0.7983; Begg's correlation test, one tailed, p= 1.00).

Determinants of self-medication. Due to the lack of a standardized and validated instrument to evaluate self-medication, each study addressed different determinants for this phenomenon. However, among these, the most recurring determinants reported were the lack of time and delays in medical care. Data on theses causes could only be extracted from eight studies. In the meta-analysis, the lack of time and delays in medical care were reported with an overall frequency of 35.2% (95% CI 25.6%-44.7%). Moreover, the subgroup meta-analysis showed that the frequency with which these causes were reported by university students who self-medicated in the last six months or throughout their lives was significantly lower (19.7%; 95% CI 10.3-29.2) than that of the general population who self-medicated in the last 30 days (47.8%; 95% CI 31.5-64.2) (Figure 2C).

Medication groups used for self-medication. Within subgroup 2, there was great variation in the frequency of use of medication groups, and the confidence intervals were not significant, so they were not considered to estimate the average frequencies. Therefore, to determine the overall frequencies, only the results of subgroups 1 and 3 were included. The meta-analysis showed that the pooled frequency of self-medication with analgesics was 29.5% (95% CI 12.6%-46.3%), anti-inflammatories 22.4% (95% CI 14.2%-30.6%), and antihistamines 9.9% (95% CI 6.8%-13.0%), while the pooled frequency for antibiotics and antiparasitics was 16.7% (95% CI 3.0%-30.4%) (Table II).

DISCUSSION

A systematic review and meta-analysis were carried out to estimate the prevalence of self-medication in Colombia and its associated factors in the population over 16, and to explore the potential effect of the self-medication time frame on its reported frequency. The pooled

prevalence of self-medication found in young people and adults in Colombia (64.2%; 95% CI 50.8%-77.5%) was similar to that recently found in a global meta-analysis of 69 articles published between 2000 and 2018 including a total of 27,890 individuals, according to which the prevalence of self-medication was 55.9% (95% CI 42.4%-68.5%) in Africa; 71.2% (95% CI 63.0%-78.3%) in Asia; 74.0% (95% CI 56.2%-86.4%) in Europe; and 60.0% (95% CI 40.2%-77.0%) in South America (2). However, that and other meta-analyses did not consider the possible effect of the recall period or time frame on the frequency of self-medication reporting. Our results show that when self-medication was evaluated for long periods, such as the previous 6-12 months or throughout life, the reported frequency was significantly higher, both in the general population (74.6%; 95% CI 61.3%- 87.9%) and in university students (84.7%; 95% CI 75.1%-94.3%), which shows that the majority have self-medicated at some point in their lives. In contrast, when self-medication was assessed during the previous 30 days, a significantly lower prevalence of self-medication was found (32.3%; 95% CI 25.4%-39.3%). When a behavior is evaluated by self-reporting, a long recall period does not allow recent changes to be detected and is associated with recall bias. For this reason, to assess the frequency of self-medication through questionnaires, surveys, and interviews, it is essential to select the recall period appropriately. Generally, a short recording period is preferable to a long one, especially when asking about recurring or frequent events (23).

Although the second objective of this study was to evaluate the factors associated with self-medication in Colombia, only some of the included studies assessed the same characteristics. However, it was possible to extract and analyze the data related to sex, groups of medications used for self-medication, and some causes associated with self-medication behavior. Regarding self-medication in men and women, we did not find differences within the general

population, but we did find a higher frequency of self-medication in female university students compared to males (OR= 1.72; 95% CI 1.17- 2.53), a finding that other authors have previously reported, and that can be explained as a strategy for relieving headaches, colds, and dysmenorrhea (24). In two of the three studies within the subgroup of university students, dysmenorrhea was reported as a cause of self-medication in 3.2 to 4.7% of the cases (12,19). The frequency of dysmenorrhea among young women ranges from 16 to 93%, with a perception of severe pain in 2 to 29%, depending on the study population (25), which has been associated with self-medication with analgesics and anti-inflammatories in 65% of cases (26). The possibility of therapeutic failure, adverse effects, and even abuse (high non-therapeutic doses) for rapid pain relief indicates the importance of gynecological assessment for young women who experience recurrent dysmenorrhea (27).

The World Health Organization has reiterated the importance of promoting policies and strategies aimed at the correct consumption of medicines; that is, in an informed and rational manner, having the necessary knowledge of the mechanism of action of the drugs, following their dosage, and knowing their side effects (3). This is especially relevant for the drugs most used for self-medication, such as analgesics and anti-inflammatories, which may cause synergism (27,28), overdose (29,30), toxicity (31,32) and, in people with chronic pathologies and polypharmacy, can lead to clinically significant drug interactions (33–37). This meta-analysis found that, within the population that self-medicated, 29.5% used analgesics, 22.4% anti-inflammatories, and 9.9% antihistamines. Other studies have also shown these drugs to be the most used for self-medication. For example, in Ethiopia, the frequency of analgesics and anti-inflammatories was 46.1% (38), and in Iran, the frequency of analgesic use was 53.2%, with 39.3% for anti-inflammatories, and 24.3% for antihistamines (39).

On the other hand, we found that antibiotics and antiparasitics were used for self-medication in 16.7% (95% CI 3.0%-30.4%) of the cases, a lower frequency than that reported in other studies and systematic reviews. Within low- and middle-income countries, pooled prevalence of self-medication with antimicrobials has been found to range from 39 to 78%, depending on the countries included in each analysis (40–42). Therefore, given this high heterogeneity, it is useful to carry out analyses by countries within the same income level group (43). The use of antimicrobials without a medical prescription is a cause for concern due to its implications for developing antimicrobial resistance, to which 1.27 million deaths in were attributed in 2019 (44).

Finally, some of the determinants of self-medication were explored; however, despite these causes being so varied and complex, it was only possible to extract information about two: lack of time and delays in care. These two situations were reported by those who self-medicated in 35.2% (95% CI 25.6%-44.7%) of the cases, although their frequency in university students was significantly lower (19.7%; 95% CI 10.3%-29.2%). Another systematic review also reported that the lack of time to see a doctor is reported recurrently by those who self-medicate (45), reaching a frequency of up to 68% in a high-income country such as Saudi Arabia (46).

As limitations of the present study, it should be considered that some studies included in the meta-analysis evaluated self-medication by self-report (memory bias). In contrast, others did so by direct pharmacy observation (information bias), which may contribute to the observed heterogeneity. Additionally, the studies analyzed did not use a standardized definition of self-

medication, a single time frame (recall period) or instruments with fully documented validity and reliability. These limitations are common to all studies on self-medication and point to the need for standardized definitions and tools. Therefore, within the recommendations and prospects for future studies, the need to develop and validate instruments to assess the occurrence of self-medication, especially responsible self-medication, as defined by the World Health Organization, is emphasized. These instruments should set a specified time frame, ideally short, as this minimizes recall bias, allows for population assessments, and can detect recent changes in behavior, for example, after an intervention. Additionally, given the impact of self-medication globally, these instruments must be developed and validated in different languages and cultural contexts, and they must evaluate the medications used.

DISCLOSURE STATEMENT

The authors report there are no competing interests to declare.

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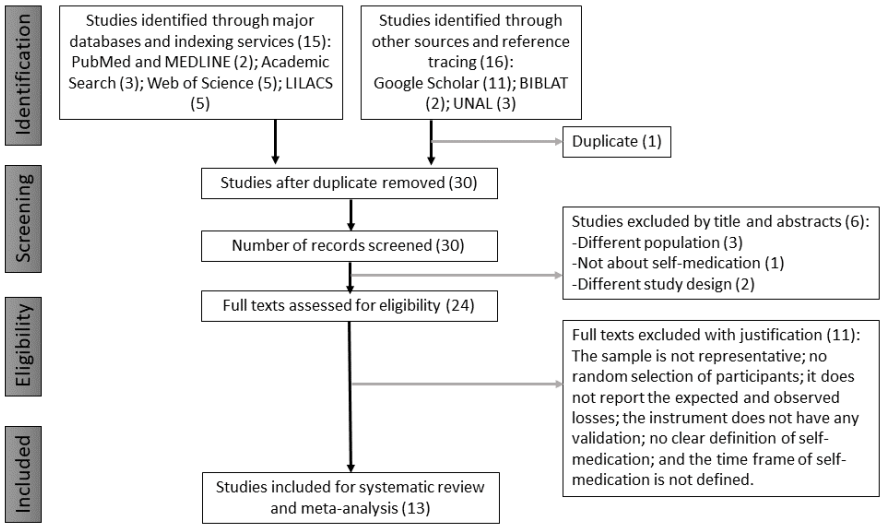


Figure 1. Flowchart of study selection.

Table I. Summary of included studies evaluating the frequency of self-medication and associated factors in young people and adults in Colombia 2000-2022.

First author	Year	Source	Population	No. of subjects	Self-medication time frame	Setting	Reference
Feria-Mejía	2021	Thesis	Adults and their families in the city of Sincelejo, department of Sucre.	150	Self-medication in the last 30 days and throughout life.	Neighborhood/home	10
Peñuela	2002	Journal article	Inhabitants of the city of Barranquilla, department of Atlántico.	350	Self-medication in the last 30 days.	Pharmacy	11
Machado-Alba	2014	Journal article	Adults from the city of Pereira, department of Risaralda.	414	Self-medication in the last 30 days and throughout life.	Home	12
López	2009	Journal article	Adult heads of household in the locality of Suba, Bogotá.	453	Self-medication in the last 30 days.	Home	13
Villegas-Cardona	2014	Journal article	Homes in the urban area of the city of Pereira; people belonging to the family nucleus (over 18 years of age).	1,127	Self-medication in the last 30 days.	Home	14
Del Toro-Rubio	2017	Journal article	Inhabitants between 20 and 59 years old, from Locality 2 of the city of Cartagena.	428	Self-medication throughout life.	Neighborhood/home	15
Fajardo-Zapata	2013	Journal article	People older than 20 years, living in 20 localities in Bogotá.	588	Self-medication throughout life.	Neighborhood/home	16
Macías-Vidal	2015	Thesis	Adults who go to grocery stores located in four municipalities of the department of Atlántico.	775	Self-medication throughout life.	Grocery stores	17
Bravo	2017	Thesis	First to fifth-semester medical students, UDCA University, Bogotá.	201	Self-medication in the last six months and throughout life.	University	19
Lopez-Cabra	2016	Journal article	First to sixth-year medical students, Universidad del Rosario, Bogotá.	270	Self-medication throughout life.	University	20
Oviedo-Córdoba	2021	Thesis	Undergraduate students enrolled in the second semester of 2019, Universidad del Magdalena, Santa Marta.	312	Self-medication throughout life.	University	21
Ortiz	2019	Journal article	University students, Universidad Cooperativa de Colombia, Neiva.	600	Self-medication throughout life.	University	22
Castro-Espinosa	2014	Journal article	Adults who buy antibiotics in selected pharmacies in Commune 5 of the city of Cali.	140	Self-medication throughout life.	Pharmacy	18

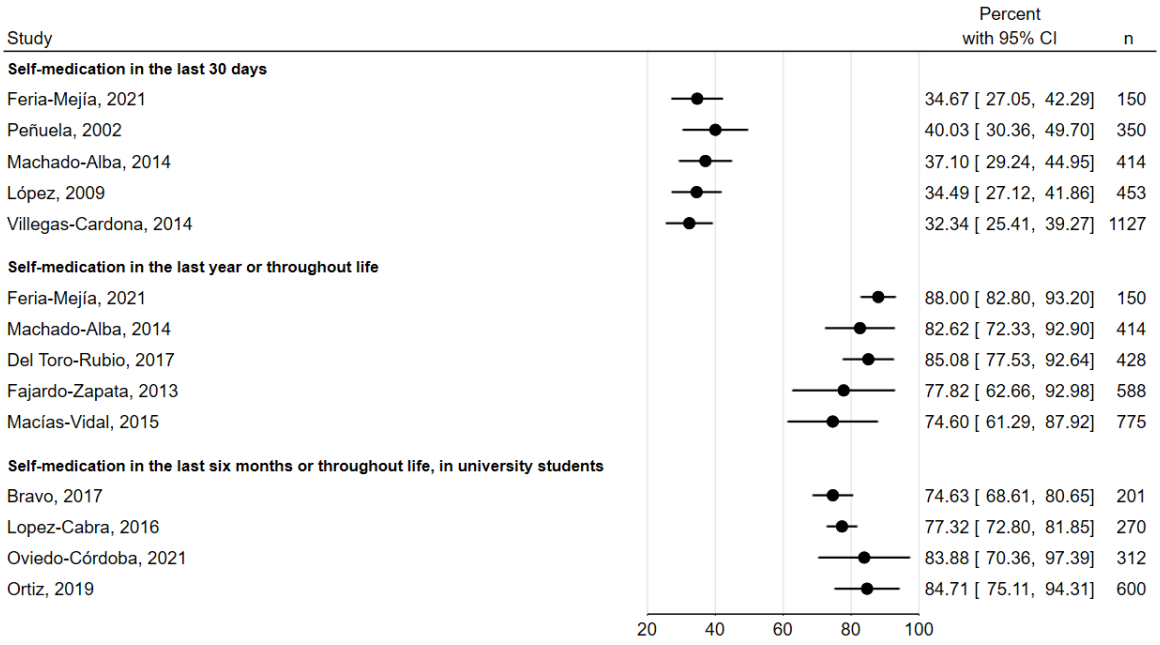
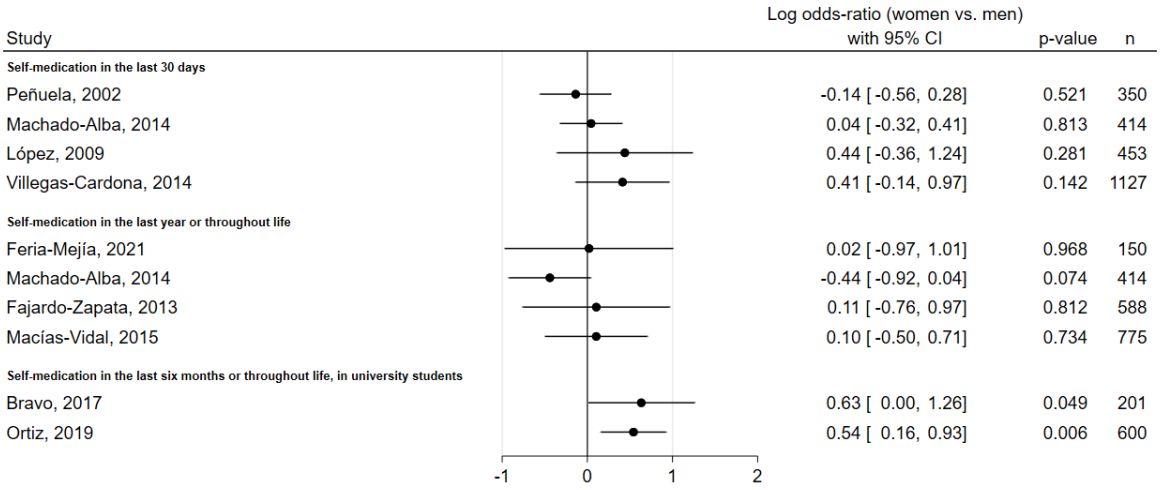
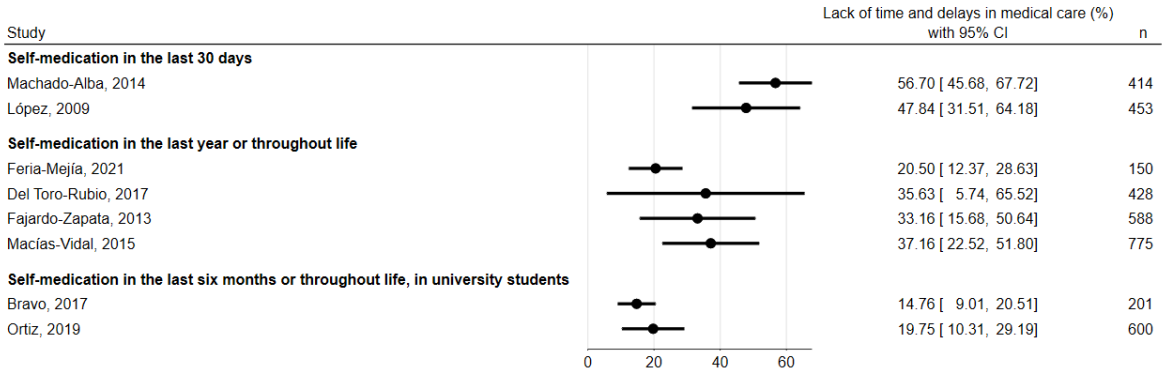


Figure 2. Subgroup analysis of studies describing: 2A) The prevalence of self-medication disaggregated by time frame and the type of population (general population or university students).



2B) The association between self-medication and sex, disaggregated by time frame and the type of population (general population or university students), with results presented as the neperian logarithm of the OR.



2C) The frequency of reporting the lack of time and delays in care as causes of self-medication.

Table II. Medication groups used for self-medication.

Subgroup	Studies	Effect size (95% Confidence Interval)			
		Analgesics	Anti-inflammatories	Antihistamines	Antibiotics and antiparasitic
Subgroup 1 Self-medication in the last 30 days	Machado-Alba, 2014 Lopez, 2009 Cardona, 2014 Peñuela, 2002 Castro-Espinosa, 2014 *	34.3% (11.9-56.7%)	24.0% (12.9-35.0%)	8.4% (5.4-11.5%)	6.6% (3.0-10.1%)
Subgroup 2 Self-medication in the last year or throughout life	Macías-Vidal, 2015 Feria, 2021	71.6% (21.7-121.4%)	59.5% (7.8-111.1%)	44.1% (-14.8-103.1%)	37.5% (-16.2-91.2%)
Subgroup 3 Self-medication in the six months or throughout life, in university students	Bravo, 2017 Ortiz, 2019 Lopez-Cabra, 2016 Oviedo-Córdoba, 2021	24.6% (2.9-46.6%)	20.8% (5.6-36-1%)	11.6% (4.6-18.5%)	28.9% (1.2-69.9%)
Overall (Subgroups 1 and 3)		29.5% (12.6-46.3%)	22.4% (14.2-30.6%)	9.9% (6.8-13.0%)	16.7% (3.0-30.4%)

*This study only evaluated self-medication with antibiotics.